

Battelle Number(s):

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Patent(s) Issued

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Available Technologies

Field Technique for Automated Dithionite Analysis to Support In Situ Redox Manipulation

SUMMARY

When deploying in-situ redox manipulation techniques for groundwater remediation, accurate measurement of the dithionite concentration is needed in laboratory and field experiments in order to assess the reduction of the sediment and ultimately the effectiveness of the in situ redox manipulation technique. Once dithionite is put in aqueous solution, it will degrade to a number of different sulfur-containing compounds over several hours, so accurate measurement of only the dithionite concentration needs to be accomplished as soon as possible. While dithionite can be accurately measured in the laboratory with several techniques (direct titration, liquid chromatography, or gas chromatography-mass spectrometry), these rely on relatively expensive (\$40K to \$70K) equipment, and additional laboratory resources including an anaerobic chamber to provide an oxygen-free environment during sample processing. Additionally, these techniques are not practical for remote field locations.

The technique described in this invention report was developed over several years of laboratory and field experiments based on the necessity for fast and accurate measurement of dithionite concentration at remote field locations.

Novel aspects of this invention include:

- * A novel fluid analysis system for performing automated fluid analysis over a widely varying concentration range (5 orders of magnitude).
- * System dilutes, mixes reagents, injects into an in-line UV detector, and records values.
- * A novel fluid analysis system for performing automated groundwater analysis that requires dilution and is oxygen sensitive. Specifically developed for analysis of sodium dithionite at concentrations from 0.1 mol/L to 10⁻⁶ mol/L.
- * An ability to monitor levels of soil chemicals following a remediation injection.

ADVANTAGES

- * This technology offers rapid field analysis for time- and oxygen-sensitive reagents.
- * This is a relatively inexpensive system. The operational units are built for approximately \$7,000 each.
- * These are specifically developed for field measurement of sodium dithionite, which is used for reduction of aquifer sediments to develop a reactive permeable barrier.

Patents & Intellectual Property

» Patent #: 6,706,527

Technology Portfolio(s)

» Remediation

Potential Industry Applications

» Agriculture & Mining

» Chemicals

» Oil & Gas

» Recycling & Waste Management

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